



A.D. 1873, 7th NOVEMBER. N° 3632.

S P E C I F I C A T I O N

OF

ALEXANDER COLVIN FRASER
AND
WILLIAM WATSON.

TREATING AND UTILIZING SEWAGE.

LONDON:

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1874.



A.D. 1873, 7th NOVEMBER. N^o 3632.

Treating and Utilizing Sewage.

LETTERS PATENT to Alexander Colvin Fraser, of New Barnet, in the County of Herts, Engineer, and William Watson, of Great Ayton, near Northallerton, in the County of York, Chemist, for the Invention of “**IMPROVEMENTS IN TREATING AND UTILIZING SEWAGE.**”

Sealed the 5th May 1874, and dated the 7th November 1873.

PROVISIONAL SPECIFICATION left by the said Alexander Colvin Fraser and William Watson at the Office of the Commissioners of Patents, with their Petition, on the 7th November 1873.

We, **ALEXANDER COLVIN FRASER**, of New Barnet, in the County of Herts, Engineer, and **WILLIAM WATSON**, of Great Ayton, near Northallerton, in the County of York, Chemist, do hereby declare the nature of the said Invention for “**IMPROVEMENTS IN TREATING AND UTILIZING SEWAGE,**” to be as follows:—

The object of this Invention is to render sewage commercially available in the manufacture of artificial manure and other manufacturing purposes by the economical elimination and treatment of the organic and oleaginous elements of the sewage, for which purpose we

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employ aluminous schistus and the analogous oil or jet rock calcined under atmospheric influence by the aid of peat, wood, or coal bats, the combined properties of which are sulphate of alumina, sulphate of iron, sulphate of magnesia, and sulphate of lime, with that of vegetable carbon.

5

The above combined elements we, when necessary, saturate with dilute sulphuric acid, and intermix with clay, sulphate of lime, or prepared dry mould, to ensure the more efficient development of their properties when brought in contact with the mass of sewage.

Our improved preparation may be applied to the treatment of the sewage in any convenient way, preferring to form the same into filter beds, through which the sewage to be utilized is caused to percolate; or the preparation may be used in a pulverized state, and thoroughly mixed with the sewage in suitable tanks or reservoirs so mechanically arranged that the effluent water may readily make its escape therefrom. The preparation so made use of for the decomposition of sewage and the deposition of its organic and oleaginous properties may in conjunction with the combined matters by it absorbed be treated and used as a manure, or may be subjected to calcination in suitable retorts, so that the residuum may be applied as a combined carbon for foundry and other purposes.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Alexander Colvin Fraser and William Watson in the Great Seal Patent Office on the 7th May 1874.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, **ALEXANDER COLVIN FRASER**, of New Barnet, in the County of Herts, Engineer, and **WILLIAM WATSON**, of Great Ayton, near Northallerton, in the County of York, Chemist, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Seventh day of November, in the year of our Lord One thousand eight hundred and seventy-three, in the thirty-seventh year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Alexander Colvin Fraser, and William Watson, Her special license that we, the said Alexander

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Colvin Fraser, and William Watson, our executors, administrators, and assigns, or such others as we, the said Alexander Colvin Fraser and William Watson, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all
5 times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN TREATING AND UTILIZING SEWAGE," upon the condition (amongst others) that we, the said Alexander Colvin
10 Fraser and William Watson, our executors or administrators, by an instrument in writing under our or their hands and seals, or under the hand and seal of one of us or them, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the
15 Great Seal Patent Office within six calendar months next, and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said Alexander Colvin Fraser, for myself and on behalf of the said William Watson, do hereby declare the nature of the said Invention, and in what manner the same is to be
20 performed, to be particularly described and ascertained in and by the following statement thereof (that is to say):—

The object of this Invention is to render sewage commercially available in the manufacture of artificial manure and other manufacturing purposes by the economical elimination and treatment of the
25 organic and oleaginous elements of the sewage, for which purpose we employ aluminous schistus and the analogous oil rock or jet rock calcined under atmospheric influence by the aid of peat, wood, or coal bats, the combined properties of which preparation or calcined compound are sulphate of alumina, sulphate of iron, sulphate of magnesia, and
30 sulphate of lime, with that of vegetable carbon.

The preparation or calcined compound containing the above-named combined elements we, when necessary, saturate with dilute sulphuric acid, and intermix with clay, sulphate of lime, or prepared dry mould, to ensure the more efficient development of their properties when brought
35 in contact with the mass of sewage.

Our improved preparation may be applied to the treatment of the sewage in any convenient way, preferring to form the same into filter

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beds, through which the sewage to be utilized is caused to percolate; or the preparation may be used in a pulverized state, and thoroughly mixed with the sewage in suitable tanks or reservoirs, so mechanically arranged that the effluent water may readily make its escape therefrom. The preparation so made use of for the decomposition of sewage and the 5 deposition of its organic and oleaginous properties may, in conjunction with the combined matters by it absorbed, be treated and used as a manure, or may be subjected to calcination in suitable retorts, so that the residuum may be applied as a combined carbon for foundry and other purposes. 10

In carrying out our Invention we take the aluminous schistus as excavated from the rocks, and place it in heaps over some burning body; it may be of peat, wood, coal bats, and oil rock or jet rock, it being necessary to form air passages with bricks so placed at the bottom as to supply air to the centre of the heap and support combustion. We go on 15 adding alternate layers of aluminous schistus interspersed with the fuel requisite to keep the whole mass burning, such fuel being in about equal proportions of peat, wood, coal bats, and oil rock or jet rock, and this has to be continued until, by reason of the size of the heap, the labour comes to be too costly in heaping up the materials together, when the mass is 20 allowed gradually to extinguish itself, as the products of combustion have been exhausted. Then we have obtained our preparation or calcined compound ready for treating with sulphuric acid, in cases where sulphuric acid is to be used, and which we prefer to apply whilst the preparation or compound is still in a slightly heated state. We prefer 25 to apply the acid after it has been diluted in the proportion of 6 lbs. or thereabouts of sulphuric acid of specific gravity 1.60, diluted with four gallons of water to every ton weight of the preparation or calcined compound.

We apply the dilute sulphuric acid to our preparation or calcined 30 compound by means of pans, having suitable roses through which the sulphuric acid is poured, so that it is spread over the whole surface of the particles of the preparation or compound, which we at the same time keep turning over to ensure that all the surfaces of the particles of the preparation shall be saturated with the dilute sulphuric acid. 35

Our improved preparation or calcined compound may be used undiluted when employed for treating sewage containing only a small portion of organic matter, but when treating sewage containing any

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considerable proportion of organic matter we saturate the calcined compound with sulphuric acid as above mentioned, the quantity of sulphuric acid being increased according to the proportion of impurity contained in the sewage to be treated.

5 We have found it advantageous to use muriatic acid in combination with the sulphuric acid in about equal proportions by weight.

We have tested our Invention in practice as applied to sewage of two different kinds, namely, sewage obtained from the district of Barnet, in the County of Herts, and sewage obtained from the district of
10 Leeds, in the County of York.

In treating sewage of the Barnet district, which contains only a small quantity of organic and oleaginous matter, we in the first place lead the sewage into a mixing tank, into which we then feed our preparation or compound, the sewage in the tank being kept in a
15 state of constant agitation, so as to thoroughly incorporate it with our preparation or compound, which we use in the proportion of about one pound by weight of the preparation or compound to every one hundred gallons of sewage. When the mixture in these proportions has been thoroughly effected, the contents of the tank are permitted to flow into
20 a settling reservoir, in which reservoir there are a series of subdivisions or walls resting on the bottom thereof, and which are placed at right angles to the direction of the flowing sewage, so that as each of the chambers so formed gets charged with the mixture, the latter overflows into the next chamber, and so on, four or other convenient number of
25 chambers being employed. The overflow from these chambers passes on to and through an adjoining filter bed composed as follows:—First, a bottom layer resting upon perforated plates and composed of rounded pebbles mixed with a small quantity of lime, the depth of this layer being about nine inches; second, on the layer just described a layer
30 about six inches deep of our preparation or calcined compound roughly ground; thirdly, on the top of the layer just described a layer about four inches deep of peat charcoal or other charcoal; and lastly, a top layer of fine river washed sand. By this plan the effluent water will be found to run off clear and free from any odour or disagreeable taste.

35 In treating sewage from the Leeds district, which is highly impregnated with organic and oleaginous matters, and much discolored, the

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samples we have treated being nearly as dark as ink, we have obtained very good results in a similar manner to that above described, but we have found it necessary to use slightly increased quantities of the sulphuric acid and of the lime. We have also used muriatic acid with advantage in treating this sewage. 5

The residuum which accumulates in the chambers of the settling reservoir as aforesaid we remove periodically and dry by exposure to the atmosphere or by other convenient process of drying, then intermix it with a small quantity of lime to form a valuable fertilizing agent or manure, or we recalcine it in retorts or equivalent apparatus, and subsequently grind or pulverize it to form a combined carbon for foundry and other purposes. 10

Having described our said Invention of improvements in treating and utilizing sewage, and having explained the manner of carrying the same into practical effect, we would have it understood that we do not claim 15 as of our Invention or the exclusive use of the several substances herein-before mentioned, except when the same are used in and for the purposes of our said Invention, which we hereby declare to consist in the treating and utilizing sewage in the manner above described. We claim particularly the calcining aluminous schistus, and the analogous 20 oil rock or jet rock under atmospheric influence by the aid of peat, wood, or coal bats, and employing the resulting preparation or calcined compound for treating and utilizing sewage as herein set forth.

In witness whereof, I, the said Alexander Colvin Fraser, have hereunto set my hand and seal, this Seventh day of May, in 25 the year of our Lord One thousand eight hundred and seventy-four,

A. C. FRASER. (L.S.)

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